Two Studies Show Green Schools in Massachusetts Make Economic Sense

According to two recent studies, the benefits of building green schools in Massachusetts significantly outweigh the modest incremental costs. A green school, also called a high-performance school, is one that saves energy, water, and waste; cuts operating expenses; protects the natural environment; and improves student and teacher health and productivity. The studies, funded by the Massachusetts Technology Collaborative (MTC), compared green schools in Massachusetts to more conventional schools.

A study by HMFH Architects, Inc., and the Vermont Energy Investment Corporation (VEIC) analyzed 8 recently designed Massachusetts green school projects. These schools experienced only 0.77% in net incremental costs for the green features after receiving utility incentives and a 2% green school incentive from the Massachusetts School Building Authority (MSBA). The benefits to school districts are almost 8 times this cost.

A study by Greg Kats of Capital E evaluates the benefits accruing to school districts as well as the benefits accruing to the Commonwealth as a whole. Even if the only financial incentives a school receives are utility incentives for energy efficiency measures, this study indicates that, at a 1.5% to 2.5% cost premium, school districts can expect benefits about 4 times the cost, while statewide benefits can add up to more than 10 times the cost premium.

Each of the Massachusetts school projects examined by either study showed average energy and water savings that exceeded 30% improvement beyond baseline requirements, demonstrating that substantial savings in these two critical and easily quantifiable categories are readily achievable.

Study by HMFH/VEIC

MTC hired HMFH Architects, Inc., which partnered with the Vermont Energy Investment Corporation (VEIC), to study the green cost premium and hard financial benefits for 8 recently designed green schools in Massachusetts. The HMFH study did not evaluate the soft benefits (e.g., health benefits, employment benefits) that were taken into account by the Kats study.

This study determines that the average green cost premium was approximately 3% without any incentives. Factoring in the available incentives (utility rebates for energy efficiency measures and the 2% incentive from MSBA) resulted in a net average cost premium of 0.8%. Even if there had not been any incentives, the benefits of green building measures would have been 1.7 times greater than the cost. With incentives, the benefits for the school districts were almost 8 times the incremental cost.

These figures do not include the costs and benefits of renewable energy generation systems that were included in these projects as a result of significant grants from MTC. When those systems are included in the analysis, the average cost premium, absent any incentives, increases from 3% to 4%. Adjusting for all available incentives from utilities, MTC, and the 2% from MSBA, the average net cost premium is only 0.8%. Including the renewable energy systems, benefits were 1.3 times the cost, and increased to 6.4 times the cost when accounting for all incentives. This analysis demonstrates that even relatively expensive green upgrades can make financial sense for school projects if they are part of an overall design that leads to substantial savings.

The HMFH/VEIC study also shows how project teams should use lifecycle cost analysis to look at their long-term project strategies. This type of analysis looks beyond the up-front costs of a product or system to see if those costs, along with maintenance and upgrade costs, are offset by financial and other benefits that accrue throughout the project's lifespan.

For example, in the areas of water efficiency, roofing materials, and flooring materials, the HMFH/VEIC study shows that different strategies for achieving the same goals can vary dramatically in terms of initial cost premium and overall lifecycle cost and benefit. Calculating the long-term costs and benefits of each strategy can help the project team determine whether green building elements and upgrades are more cost-effective than conventional building materials. While the green elements may cost more initially, the true costs of these elements are often lower due to associated financial and other savings, such as reduced need for maintenance. Lifecycle cost analysis can also help teams to choose between competing green strategies (e.g., rainwater harvesting systems have a lower payback than efficient plumbing fixtures).

Study by Greg Kats of Capital E

MTC asked Greg Kats, a nationally known author of the most widely referenced study of the costs and benefits of green buildings,[1] to examine the costs and economic benefits of green schools in Massachusetts. For 30 school projects, Kats examined incremental costs and a wide range of both hard and soft benefits, from energy and water savings to emissions benefits, health benefits, employment impacts, and increased earnings benefits.

Kats finds that Massachusetts green schools cost between 1.5% and 2.5% more than conventional schools, but provide financial benefits that can be more than 10 times greater.[2] According to the study, "Greening school design provides an extraordinarily cost-effective way to enhance student learning, reduce health costs and, ultimately, increase school quality and competitiveness at both the student and state level." The study further states that, "Building green schools is today significantly more fiscally prudent and lower risk than continuing to build unhealthy, inefficient schools," and that "Extension of the 2% incentive for all high performance schools would be a prudent and cost-effective policy."[3] The large net financial benefits from greening indicate that a state-wide requirement to build only healthy and efficient green schools is also fiscally prudent. In fact, the central recommendation of the report is that, "Massachusetts should ensure that all future school construction be green."

More specifically, the study finds that, for a typical school in Massachusetts, the cost premium for building green is almost $4 per square foot, but the financial benefits may be up to $70 per square foot. According to the study, "Only a portion of these savings accrue directly to the school. Lower energy and water costs, improved teacher retention, and lowered health costs save green schools directly about $15/ft^2, about four times the additional cost of going green." Kats discusses state-wide financial savings that include reduced cost of public infrastructure and lower air and water pollution.

Kats examines the costs and benefits of meeting the Massachusetts High Performance Green Schools Guidelines (MA-CHPS). MA-CHPS is the Massachusetts version of the Collaborative for High Performance Schools guidelines that were originally developed for use with California schools. CHPS is based substantially on LEED (the U.S. Green Building Council's Leadership in Energy and Environmental Design benchmarking tool), but has been

1 Kats, Greg et. al. The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force*, California Sustainable Building Task Force, October 2003.*

2 Results do not take into consideration costs and benefits of renewable energy generation systems.

3 The 2% is currently available under existing law to school projects that meet industry energy efficiency standards.

tailored for school buildings. Kats finds that "achieving MA-CHPS costs, on average, 1.5% to 2.5% more than conventional school design," and that "achieving MA-CHPS prerequisites costs between 0% and 0.5%." These conclusions assume the availability of utility energy efficiency rebates (available for all school projects in investor-owned utility service areas), but they do not include incentive funding from either the MSBA or MTC.

The Kats study concludes that green school construction costs should decline over time because of the learning curve associated with designing and building green schools. As consultants and contractors gain experience with a green approach, they should be able to work more efficiently and more precisely identify the most cost-effective green building measures. Pennsylvania, Oregon, and Washington have all seen costs decline with increased building experience.

Conclusion

The results of the studies show that building green schools in Massachusetts is much more cost-effective in the long run than building conventional schools. The return on the initial investment for green schools dwarfs the return on most conventional investments. Green schools provide substantial benefits not only for school districts, but also quite dramatically for the Commonwealth as a whole.

To view the complete studies, visit: *www.masstech.org/renewableenergy/green_schools/studies.html*.

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